REMARKS/ARGUMENTS

Brief Summary of Status

Claims 1-84 are pending in the application.

Claims 1-84 are rejected.

35 U.S.C. § 112

In the above-referenced office action, the Examiner asserts the following:

"3. **Claims 1-47** are rejected under 35 U.S.C. 112, first paragraph …." (office action, Part of Paper No./Mail Date 20080830, p. 2)

The Applicant respectfully traverses.

The Applicant has amended certain of the claims.

On pages 2-3 of the office action, the Examiner asserts that the Applicant's specification does not reasonably provide enablement for ". . . each DEV of the plurality of DEVs and the PNC is operable to communicate with one another using UWB pulses; based on narrowband interference within a spectrum of the UWB pulses that are transmitted across a communication link within the piconet, the PNC assigns a PN code from a plurality of PN codes to spread the UWB pulses transmitted across the communication link; the assigned PN code has at least one narrowband blocking interval that substantially nulls at least one portion of the spectrum of the UWB pulses around which the narrowband interference is substantially centered thereby substantially eliminating the narrowband interference ..." (claim 1)." (emphasis added)

On pages 3-4 of the office action, the Examiner also asserts that "For example, Specification discloses PN codes are assigned to minimize narrowband interference and to support communication across the communication links between the PNC and the DEVs. However, claim 1 recites "a PN code … to spread the UWB pulses transmitted across the communication link" in lines 10-11 and "a communication link within the piconet" in line 9. Specification also discloses to null portions of the UWB spectrum to substantially eliminate the narrowband interference by strategically placing zeroes in PN sequences of PN codes. However, claim 1 merely recites " ... the

assigned PN code has at least one narrowband blocking interval that substantially nulls at least one portion of the spectrum of the UWB pulses ..." This limitation is vague and indefinite with regard to the meaning of nulling. As a matter of fact, to null can even be interpreted broadly as blocking based on the claim recitation. Lastly, Specification does not disclose any UWB pulses. However, claim 1 is confusing to recite "each DEV of the plurality of DEVs and the PNC is operable to communicate with one another using UWB pulses" in lines 6-7 and "assigns a PN cods . . . to spread the UWB pulses transmitted across the communication link" in lines 10-11, and then repeats "when transmitting a UWB pulse across the communication link [which communication link? Is this the same as communicating with UWB pulses?], at least one of a DEV of the plurality of DEVs and the PNC spreads the UWB pulses using the assigned PN code" in lines 16-18.

Claims 2-20 depend from rejected claim 1.

Claim 21 is rejected similarly to claim 1.

Claims 22-35 depend from rejected claim 21.

Claim 36 is rejected similarly to claim 1.

Claims 37-47 depend from rejected claim 36." (emphasis added)

For example, with respect to the Examiner's comment of "Specification does not disclose any UWB pulses", the Applicant respectfully points out that, among other locations, on p. 10 of the Applicant's specification, first paragraph, the Applicant teaches and discloses:

"FIG. 1A is a diagram illustrating an embodiment of the frequency spectrum of a UWB (Ultra Wide Band) signal when compared to some other signal types according to the invention. In contradistinction to RF (Radio Frequency) communications that operate by using a narrowband frequency carrier to transmit information, UWB communications operate by sending pulses of energy across a broad frequency spectrum. For example, an RF signal may be viewed as occupying the range of spectra of a narrowband frequency. Also, in contradistinction to a spread-spectrum signal whose PSD (Power Spectral Density) generally rises above the PSDs of other interfering signals within an available spectrum and also occupies a relatively narrower portion of the available spectrum, a UWB signal may actually be viewed as

being a pulse shaped signal (that may never exceed the PSDs of other interfering signals within the available spectrum). A spread-spectrum signal may be viewed a signal that occupies a frequency band that is much wider than the minimum bandwidth required by the information signal. For example, a transmitter "spreads" the energy (that is typically originally concentrated in narrowband) across a wider frequency band. One benefit of a spread-spectrum signal is that it provides increased immunity with respect to narrowband interference. A narrowband signal will not fully obliterate the UWB signal because of the much wider bandwidth of the UWB signal. It is also important to note that a UWB signal may also be characterized as a function of time, not frequency." (emphasis added)

Clearly, "UWB communications operate by sending pulses of energy across a broad frequency spectrum" (e.g., UWB pulses), "a UWB signal may actually be viewed as being a pulse shaped signal", and also "a transmitter "spreads" the energy (that is typically originally concentrated in narrowband) across a wider frequency band".

With respect to the Examiner's assertion that the Applicant fails to disclose "a PN code … to spread the UWB pulses transmitted across the communication link", the Applicant respectfully points out that, among other locations, on p. 12 of the Applicant's specification, second paragraph, the Applicant teaches and discloses:

"The operation of communication devices (e.g., users) is performed using a PN (Pseudo-Noise) code that is typically orthogonal to the other PNs codes employed by the other communication devices within the communication system. This PN code is oftentimes referred to as a spreading code. A modulated signal is spread using that spreading code and the spread signal is then transmitted across a communication channel (e.g., a PHY (physical layer) link that communicatively couples 2 devices within the piconet). At a receiver end of the communication channel, this same spreading code (e.g., this PN code) is employed to de-spread the code so that data sent from a particular device may be demodulated by the appropriate destination device." (emphasis added)

The Applicant respectfully believes that one having skill in the art to which the invention pertains, when considering subject matter included within the Applicant's

originally filed specification (including figures and written description), would understand and comprehend that UWB pulses are employed to support communications between various communication devices.

Moreover, the Applicant respectfully points out that one having skill in the art to which the invention pertains would understand and comprehend that a spread signal (e.g., spread using a PN code, which is oftentimes referred to as a spreading code) may be composed of UWB pulses that are transmitted across a communication link within a piconet (e.g., between a PNC and a DEV or other communication devices within the piconet). Any one or both of the PNC and any one of the DEVs could use the PN code to spread the UWB pulse to be transmitted across a communication link within the piconet.

The Applicant also refers the Examiner to at least p. 14-15 of Applicant's specification that teaches and discloses that a PN code may include at least one zero therein to operate as a narrowband blocking interval. Moreover, the Applicant respectfully points out that one having skill in the art to which the invention pertains would understand and comprehend that a PN code is a sequence of +1 and -1 and that zeroes placed therein serve as a narrowband blocking interval (as Applicant also teaches and discloses on at least p. 15 of Applicant's specification).

In view of at least the Applicant's comments provided above and the amendments to certain of these claims, the Applicant respectfully asserts that the specification does enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with claims 1-47.

As such, the Applicant respectfully requests that the Examiner withdraw these rejections.

"4. **Claims 56-84** are rejected under 35 U.S.C. 112, first paragraph …." (office action, Part of Paper No./Mail Date 20080830, p. 4)

The Applicant respectfully traverses.

The Applicant has amended certain of the claims.

The Applicant again refers the Examiner to at least p. 14-15 of Applicant's specification that teaches and discloses that a PN code may include at least one zero therein to operate as a narrowband blocking interval. Moreover, the Applicant respectfully points out that one having skill in the art to which the invention pertains would understand and comprehend that a PN code is a sequence of +1 and -1 and that zeroes placed therein serve as a narrowband blocking interval (as Applicant also teaches and discloses on at least p. 15 of Applicant's specification).

The Applicant also refers Examiner to comments made above with respect to Applicant's teaching and disclosure of UWB pulses, using PN code to spread UWB pulses transmitted across a communication link, etc. as can be found within the Applicant's originally filed specification (including figures).

The Examiner again asserts that "Specification does not disclose any UWB pulses." (emphasis added)

However, the Applicant does in fact teach and disclose "UWB pulses" as also described and cited above within Applicant's specification.

In view of at least the Applicant's comments provided above and the amendments to certain of these claims, the Applicant respectfully asserts that the specification does enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with claims 56-84.

As such, the Applicant respectfully requests that the Examiner withdraw these rejections.

"6. **Claims 1-84** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention," (office action, Part of Paper No./Mail Date 20080830, p. 6)

The Applicant respectfully traverses.

The Applicant has amended certain of the claims.

The Applicant also refers Examiner to comments made above with respect to Applicant's teaching and disclosure of UWB pulses, using PN code to spread UWB

pulses transmitted across a communication link, etc. as can be found within the Applicant's originally filed specification (including figures).

The Applicant respectfully points out that one having skill in the art to which the invention pertains would understand and comprehend that a communication link, in the context of wireless communications in a piconet as described and claimed by the Applicant, is a wireless connection between two communication devices across which the UWB pulses are transmitted.

The Applicant again refers the Examiner to at least p. 14-15 of Applicant's specification that teaches and discloses that a PN code may include at least one zero therein to operate as a narrowband blocking interval. Moreover, the Applicant respectfully points out that one having skill in the art to which the invention pertains would understand and comprehend that a PN code is a sequence of +1 and -1 and that zeroes placed therein serve as a narrowband blocking interval (as Applicant also teaches and discloses on at least p. 15 of Applicant's specification).

With respect to the Examiner comments on page 6 of the office action regarding "it is unclear what is meant by "the narrowband interference is substantially centered", in line 14 because how does one centers interference. One can center a frequency, but not interference.", the Applicant refers the Examiner to at least page 16, line 20 to page 17, line 24, in which the Applicant teaches and discloses:

"The various PN codes include PN sequences that include strategically placed zeroes (0s) that are operable to effectively null portions of the UWB spectrum as to substantially eliminate the narrowband interference therein. For example, the DEV 1 operates within a region having interference generated by an IEEE (Institute of Electrical & Electronics Engineers) 802.11b WLAN (Wireless Local Area Network); therefore, the interference of the communication link between the DEV 1 and the PNC is substantially centered around approximately 2.4 GHz (Giga-Hertz). Therefore, the PN code that supports communication across the communication link between the DEV 1 and the PNC includes a PN sequence that substantially nulls the UWB signal around approximately 2.4 GHz.

Similarly, the DEV 2 operates within a region having interference generated by an IEEE 802.11a WLAN; therefore, the interference of the communication link

between the DEV 2 and the PNC is substantially centered around approximately 5 GHz. Therefore, the PN code that supports communication across the communication link between the DEV 2 and the PNC includes a PN sequence that substantially nulls the UWB signal around approximately 5 GHz.

In general, a PN code may be employed that effectively nulls the UWB signal around any frequency of concern within the UWB signal space. For example, the DEV 3 may operate within a region having interference that is substantially centered around a approximately X Hz. Therefore, the interference of the communication link between the DEV 3 and the PNC is substantially centered around approximately X Hz. Therefore, the PN code that supports communication between the DEV 3 and the PNC includes a PN sequence that substantially nulls the UWB signal around approximately X Hz.

The intelligent assignment of PN codes across any of the various communication links may also null more than one portion of the spectrum of the UWB signal. As an example, the p2p communication link between the DEVs 2 & 3 will experience interference substantially centered around both 5 GHz and X Hz. Therefore, the PN code that supports p2p communication between the DEVs 2 & 3 includes a PN sequence that substantially nulls the UWB signal around approximately X Hz as well as around approximately 5 GHz.

This principle of nulling multiple portions of the UWB spectrum may also be employed across any of the communication links between any one of the DEVs and the PNC without departing from the scope and spirit of the invention. Moreover, this embodiment shows how different PN codes may be selectively assigned to the communication links between individual devices within the piconet." (emphasis added)

The Applicant respectfully asserts that one having skill in the art to which the invention pertains would understand and comprehend interference inherently occurs around the given frequency (e.g., X Hz as described above). The Applicant respectfully points out that the narrowband interference is substantially centered around a portion of the spectrum of the UWB pulses (e.g., the frequency X Hz is within the spectrum of the UWB pulses). The assigned PN code has at least one narrowband blocking interval,

composed of at least one zero in the assigned PN code, that substantially nulls at least one portion of the spectrum of the UWB pulses around which the narrowband interference is substantially centered thereby substantially eliminating the narrowband interference.

The Applicant respectfully points out that the narrowband interference does not get centered by the assigned PN code, but rather the narrowband interference simply exists where it occurs (i.e., the assigned PN code does not center the narrowband interference, but rather the nulling of at least one portion of the spectrum of the UWB pulses in the location of the narrowband interference – i.e., where the around which the narrowband interference is substantially centered). In contradistinction, the assigned PN code has at least one narrowband blocking interval, composed of at least one zero in the assigned PN code, that substantially nulls at least one portion of the spectrum of the UWB pulses around which the narrowband interference is substantially centered.

In other words, the assigned PN code selectively operates to substantially null at least one portion of the spectrum of the UWB pulses around which the narrowband interference is substantially centered.

The Applicant respectfully asserts that one having skill in the art to which the invention pertains would understand and comprehend this claimed subject matter, and that the nulling is selected to be in the locale of the narrowband interference (i.e., substantially centered around the narrowband interference).

With respect to the Examiner comments regarding claim 6, the Applicant refers the Examiner to at least page 21, line 26 to page 22, line 9, in which the Applicant teaches and discloses:

"Again, as shown in this embodiment, the grouping of the DEVs into the various groups is performed based on the radial distances emanating from the PNC in ever increasing circles (with respect to 2 dimensions) or ever increasing spheres (with respect to 3 dimensions). To determine these relative distances between the PNC and the DEVs, the PNC transmits UWB (Ultra Wide Band) pulses to each of the DEVs. After each corresponding DEV receives its respective UWB pulse, that DEV transmits another UWB pulse back to the PNC. The PNC performs ranging of the relative position of each DEV using the time duration of a round trip of the transmitted UWB pulse and the received UWB pulse thereby determining the relative distance between

the PNC and each DEV. This may be performed borrowing on the relatively short duration of UWB pulses (e.g., typically less than 1 nsec (nano-sec) in duration). These UWB pulses will typically therefore travel at a velocity of approximately 1nsec/ft (1 nano-sec per foot). This allows the PNC to resolve signals to within approximately 1 nsec time intervals thereby providing a relatively precise determination of the relative locations of the DEVs with respect to the PNC." (emphasis added)

The Applicant respectfully asserts that one having skill in the art to which the invention pertains would understand and comprehend that UWB pulses are sent from the PNC to each of the DEVs (e.g., each DEV receives its respective UWB pulse). For a particular DEV, once it receives its respective UWB pulse, that particular DEV then transmits at least one additional UWB pulse back to the PNC. The transmitted UWB pulse is sent from the PNC to a particular DEV, the received UWB pulse is sent from the particular DEV back to the PNC. The round trip time is then the time duration of the transmitted UWB pulse (e.g., sent from the PNC to a particular DEV) plus the time duration of the received UWB pulse (e.g., sent from the particular DEV back to the PNC).

With respect to the Examiner comments regarding claim 8, the Applicant respectfully points out that a PNC and at least two DEVs are included therein. The PNC transmits a respective UWB pulse to each of the at least two DEVs.

The Applicant also refers the Examiner to at least page 21, line 26 to page 22, line 9, as cited above, in which the Applicant teaches and discloses "the PNC performs ranging of the relative position of each DEV using the time duration of a round trip of the transmitted UWB pulse and the received UWB pulse thereby determining the relative distance between the PNC and each DEV".

Also, the Applicant refers the Examiner to at least page 22, line 24 to page 23, line 12, in which the Applicant teaches and discloses:

"FIG. 11A is a diagram illustrating an embodiment of position determination of devices in a piconet according to the invention (shown using triangulation). This embodiment shows how triangulation may be employed using the ranging performed by p2p (peer to peer) communication between the various DEVs as well as the ranging performed between the PNC and the DEVs. In knowing the relative distances between

3 different devices, it is known that their relative location with respect to one another can be determined with a high degree of accuracy.

For example, p2p ranging between a DEV 1 and a DEV 2 as well as the ranging information between the PNC and the DEV 1 and the DEV 2 may all be employed to determine the specific location of these devices within the region with respect to one another. The PNC may perform the ranging itself between the DEV 1 and the DEV 2, and the PNC may direct one or both of the DEV 1 and the DEV 2 to perform p2p ranging between themselves. Then, one or both of the DEV 1 and the DEV 2 may communicate this ranging information back to the PNC so that the PNC may perform triangulation to determine the specific locations of the 3 devices with respect to one another. This way, a more precise grouping of the DEVs may be performed. Alternatively, an appropriate PN code may be assigned for the communication links between each and every DEV that may be serviced by the PNC. Triangulation may similarly be performed using the PNC and the DEVs 2 & 3." (emphasis added)

The Applicant respectfully asserts that one having skill in the art to which the invention pertains would understand and comprehend that relative position between two devices is with respect to each other (e.g., a first device is X meters away from a second device). The relative position of a device is a function of and based on its position with respect to another device.

These comments provided above by the Applicant are also applicable to the other claims the Examiner rejects under 35 U.S.C. 112, second paragraph.

The Applicant respectfully asserts that the Applicant does particularly point out and distinctly claim the subject matter which applicant regards as the invention in these claims.

As such, the Applicant respectfully requests that the Examiner withdraw these rejections.

Allowable Subject Matter

In the above-referenced office action, the Examiner asserts the following:

"7. Claim 48 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

8. Claims 49-55 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims." (office action, Part of Paper No./Mail Date 20080830, p. 9)

The Applicant respectfully traverses.

The Applicant has amended certain of the claims.

As such, the Applicant respectfully requests that the Examiner withdraw these rejections.

The Applicant respectfully believes that claims 1-84 are in condition for allowance and respectfully requests that they be passed to allowance.

The Examiner is invited to contact the undersigned by telephone or facsimile if the Examiner believes that such a communication would advance the prosecution of the present U.S. utility patent application.

RESPECTFULLY SUBMITTED,

By: /SXShort/ Reg. No. 45,105

Shayne X. Short, Ph.D., Reg. No. 45,105
Direct Phone: (512) 825-1145
Direct Fax No. (888) 456-7824

GARLICK HARRISON & MARKISON
ATTORNEYS AT LAW
P.O. BOX 160727
AUSTIN, TEXAS 78716-0727
TELEPHONE (512) 825-1145 / FACSIMILE (888) 456-7824 or (888) 711-8305